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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/633,002	08/04/2000	Keiji Ishibashi		2248

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EXAMINER

MARKHAM, WESLEY D

ART UNIT PAPER NUMBER

1762

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/633,002

Applicant(s)

ISHIBASHI, KEIJI

Examiner

Wesley D Markham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-16 and 27-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27-32 is/are allowed.
- 6) ☒ Claim(s) 11-16 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892).
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendment filed by the applicant on 10/8/2004, in which independent Claims 11 and 27 were amended, and Claim 33 was added.
Claims 11 – 16 and 27 – 33 are currently pending in U.S. Application Serial No. 09/633,002, and an Office Action on the merits follows.

Drawings

2. The formal drawings (2 sheets, 3 figures) filed on 8/4/2000 are approved by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 11, 12, 15, 16, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamanaka et al. (USPN 6,592,771 B1).
5. Regarding independent **Claim 11**, Yamanaka et al. teaches a method for etching (i.e., "removing") a deposited film from a member (i.e., a substrate "1") located in a vacuum apparatus, the vacuum apparatus having a chamber "44" (Abstract, Figures

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1 – 3, Col.10, lines 27 – 67, and Col.11, lines 1 – 7), the method comprising providing a hot element “46” in the chamber, the hot element disposed away from the deposited film and having at least a surface which comprises platinum (Figures 1 – 3, Col.5, lines 48 – 60, Col.7, lines 20 – 34, and Col.10, lines 46 – 55), placing the member (i.e., substrate) in the chamber (Figures 1 – 3, Col.10, lines 29 – 55), exhausting the chamber (Figures 1 – 3, Col.10, lines 56 – 58, and Col.11, lines 53 – 62), heating the hot element to 400° C or higher (Col.10, lines 46 – 50 and 62 – 63) without generating a plasma (Col.2, lines 63 – 65, Col.3, lines 4 – 9, Col.11, lines 48 – 52), supplying into the chamber a cleaning gas containing at least one of a fluorine atom and a chlorine atom (Col.6, lines 61 – 65, Col.10, lines 59 – 67), contacting the cleaning gas with the heated hot element to decompose and/or activate the cleaning gas and generate an activated species therefrom (Col.5, lines 61 – 65, Col.10, lines 66 – 67, and Col.11, lines 1 – 8), and allowing the activated species to etch the deposited film (Col.5, lines 55 – 65, and Col.11, lines 1 – 24). Yamanaka et al. does not explicitly teach that the etching of the deposited film converts the film into a gaseous substance that is removed from the chamber. However, Yamanaka et al. does teach etching films such as silicon with a reaction gas such as CF₄ that has been previously activated by contacting the gas with a platinum hot filament (Col.10, lines 56 – 65, Col.11, lines 1 – 8, and Col.12, lines 40 – 67). This etching process would have inherently converted portions of the silicon film into a gaseous substance due to a chemical reaction that takes place between a gas such as CF₄ and a deposited silicon film (see, for example, pages 8 – 9 of the applicant’s specification,

which shows that an activated cleaning gas such as CF_4 reacts with silicon films to convert the films into gaseous substances). Additionally, it is clear that Yamanaka et al. does not desire contaminants to remain in the chamber after the etching process (Col.12, lines 26 – 30), and the chamber of Yamanaka et al. can clearly be exhausted (Figures 1 – 2, Col.10, lines 56 – 58, and Col.11, lines 53 – 62).

Therefore, it would have been obvious to one of ordinary skill in the art to remove the gaseous substance from the chamber of Yamanaka et al. by exhausting the chamber with the reasonable expectation of (1) success, as the chamber of Yamanaka et al. is clearly capable of being exhausted, and (2) obtaining the advantages of removing undesirable contaminants in gaseous form from the chamber, such as reducing the amount of gaseous material that builds-up in the chamber and re-deposits, thereby contaminating the chamber and/or the substrate therein. Regarding **Claim 12**, Yamanaka et al. also teaches that the chamber comprises a CVD apparatus and the method further comprises heating the hot element, supplying a material gas to the chamber, contacting the material gas with the hot element to cause decomposition and/or activation of the material gas by the hot element, and forming a deposited film which comprises at least one element from the material gas on a substrate (Figures 1 – 3, Col.12, lines 40 – 67).

Regarding **Claims 15 and 16**, Yamanaka et al. also teaches that the etching (i.e., cleaning) gas is, for example, CF_4 (Col.10, lines 59 – 65). Regarding **Claim 33**, Yamanaka et al. also teaches that the member placed in the chamber is, for example, a sensor (Col.10, lines 5 – 6).

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6. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamanaka et al. (USPN 6,592,771 B1) in view of Iwasaki et al. (JP 03-226578 A).
7. Yamanaka et al. teaches all the limitations of **Claims 13 and 14** as set forth above in paragraph 5, except for a method wherein at least part of a surface of an inner structure of the chamber is covered with platinum. However, Yamanaka et al. does teach cleaning the chamber walls with fluorine-containing gases such as CF_4 , C_2F_6 , and NF_3 (Col.12, lines 15 – 39). Iwasaki teaches that, in order to improve the corrosion resistance of a device in which both deposition and etching take place (i.e., a device such as the one taught by Yamanaka et al.), the inner surface of the chamber can be coated with a protective layer of platinum so that, even if the inside of the device is cleaned with a fluorine-based gaseous etchant, the internal surfaces are not corroded and the device can be used over a long period of time (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art to cover the inner surfaces of the chamber of Yamanaka et al. with platinum as taught by Iwasaki with the reasonable expectation of successfully and advantageously protecting the inside of the chamber from corrosion by the fluorine-based cleaning gases of Yamanaka et al., thereby increasing the useful life of the chamber.
8. Applicant cannot rely upon the foreign priority papers to overcome the above rejections based on Yamanaka et al. because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Response to Arguments

9. First, please note that independent Claims 11 and 27, as amended, require that the process include heating the platinum-comprising hot element in the chamber without generating a plasma. Since Bluck et al. clearly teaches and desires forming a plasma while heating the hot element in the chamber in order to perform the CVD and chamber cleaning processes (see the entire Bluck et al. reference, including the title), Bluck et al., alone or in combination, does not teach or reasonably suggest heating the hot element without generating a plasma in the context of the applicant's claims. Therefore, the applicant's arguments filed on 6/14/2004 regarding the 35 U.S.C. 103(a) rejections based, in part, on Bluck et al. are persuasive, and the rejections are withdrawn.
10. Applicant's arguments filed on 6/14/2004 and regarding the Hatakeyama et al. and Yamanaka et al. references have been fully considered but they are not persuasive for the following reasons.
11. In response to applicant's argument that Hatakeyama et al. is non-analogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Hatakeyama et al. teaches that, in order to activate a highly-reactive gas such as a gas containing either a halogen or a halide by contacting the gas with a hot filament, the hot filament should be made of platinum, which is an

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inert metal, so that the filament does not deteriorate or become disconnected due to reaction with the gas (Col.3, lines 21 – 26, 34 – 37, and 60 – 66; Col.4, lines 1 – 10).

This is exactly the same problem that the applicant is concerned with. Therefore, the Hatakeyama et al. reference is reasonably pertinent to the particular problem with which the applicant was concerned and is analogous art for the purposes of a 35 U.S.C. 103(a) rejection.

12. The applicant also argues that Yamanaka et al. teaches cleaning the chamber walls with fluorine-containing gases by utilizing a plasma, which is very different from the claimed method of heating the hot element without generating a plasma. In response, this argument is not convincing. First, the examiner agrees with the applicant's argument that Yamanaka et al. does not teach cleaning the chamber walls in the manner claimed by the applicant, as evidenced by the fact that Claims 27 – 32, which require removing a deposited film from a chamber wall, have not been rejected based on Yamanaka et al. However, independent Claim 11 merely requires removing a deposited film from a member located in the vacuum chamber / apparatus. Yamanaka et al. reasonably suggests a method for etching (i.e., "removing") a deposited film from a member (i.e., a substrate "1") located in a vacuum apparatus / chamber "44" (Abstract, Figures 1 – 3, Col.10, lines 27 – 67, and Col.11, lines 1 – 7) in the manner claimed by the applicant (see the discussion in paragraph 5 above), thereby rendering Claims 11 – 16 and 33 obvious under 35 U.S.C. 103(a).

Allowable Subject Matter

13. Claims 27 – 32 are allowed. The following is a statement of reasons for the indication of allowable subject matter: Independent Claim 27, from which Claims 28 – 32 depend, requires removing a deposited film from a wall inside a chamber by heating a platinum-containing hot element to a temperature of 400° C or higher without generating a plasma, supplying the chamber with a cleaning gas containing at least one of a fluorine atom and a chlorine atom and first contacting the hot element with the gas to activate the gas, thereafter contacting the deposited film with the activated cleaning gas and converting the film into a gaseous substance, and removing the gaseous substance from the chamber. This method is not taught or reasonably suggested by the prior art of record. Please note that, in allowing Claims 27 – 32, the “wall inside a chamber” from which the deposited film is removed, as required by the claims, has been interpreted by the examiner to be any of the inside walls of the chamber (see, for example, page 8, lines 28 – 30, and page 9, lines 16 – 19, of the specification, which support the examiner's interpretation of the claims). Therefore, etching / removing a deposited film from the “walls” of a substrate inside the chamber (e.g., the walls of a trench in a semiconductor substrate or device) would not be encompassed by the applicant's claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Muranaka et al. (USPN 6,410,454) teaches removing

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contaminants on the surface of a semiconductor wafer by activating a halogen-containing gas with a heated filament made of platinum and then contacting the activated cleaning gas with the surface of the wafer.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

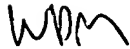
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WDM

Wesley D Markham
Examiner
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FRED A. PARKER
PRIMARY EXAMINER